UPON CERTAIN ASPECTS OF CALCULOUS ANURIA WITH ESPECIAL REFERENCE TO THE PERFORMANCE OF BILATERAL NEPHROLITHOTOMY SIMULTANEOUSLY IN SOME CASES OF THIS CONDITION.*

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IF in a case of calculous anuria one kidney is laid open and a stone is removed from it or from its ureter and it is then seen that that kidney's secreting substance has been wholly destroyed, it is clear that the operation will have merely added more or less shock to the already critical condition of the patient without having secured any compensating advantage whatsoever. Equally is it obvious that whatever there may have been of renal functional activity possessed by the individual before the occurrence of anuria, must have resided in the other kidney, and it is evident that the only hope of saving life under such circumstances lies in immediately cutting into that opposite kidney, since only by so doing can we set free its suppressed function, this suppression being the factor which will cause death if it is not overcome within a short time.

Now, if instead of being wholly destroyed, the kidney first operated upon was seen to be in greater or less degree diseased, the logical inference would be that in degree inverse to the extent of disease and functional incapability of this kidney, the other one would be found to be more or less free from disease and more or less functionally capable. In other words, the worse the condition of the first kidney, the better may we expect to find that of the other one, and vice versa.

It is as we all know, impossible to determine from the thickness or thinness of the layer of renal substance that such kidneys are seen to possess at the time of operation, just what amount of functional activity may be left to them, but we can give a pretty good guess at it, and if in our judgment, it is very doubtful if the first kidney opened has enough sound secreting substance to enable it alone to sustain life, we should, in the writer's belief, at once operate upon the other kidney. In so doing, we may, it is true, fail to save the patient's life, but we shall have given him his best and often his only chance of life by putting in commission again all the available functionally active renal substances that he possesses.

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If on the contrary, the first kidney has a goodly amount of renal substance which is apparently free from disease, the indication *not* to operate upon the second kidney would be equally clear, since the better the condition of the first one, the less likely will it be that there is any functional value in the second one, and correspondingly the less the advantage to be gained from operating upon it.

The above propositions appear to be simple and logical, and so obviously true, that it would scarcely seem worth while to present them, were it not for the fact, so far as the writer can learn, that he is the only surgeon who has acted upon them.

The question which arises when considering these propositions is how often, if at all, are the conditions just stated likely to be encountered.

In calculous anuria, apart from those instances in which the condition is brought about by anomalies of the kidneys or ureters, one of the three following things is generally stated to be the causal factor: (1) The simultaneous blocking of both ureters by calculi of both sides. (2) The blocking of one ureter, the other kidney being absent. (3) The blocking of one ureter, the other kidney being so far diseased or destroyed as to be functionally useless.

The suppression of the function of a normal kidney with an unobstructed ureter, by reflex influence, originating in the blocking of the ureter of its fellow organ on the other side, is denied by many observers. In parenthesis it may be said that there are very few cases in which the occurrence of this phe-

OPERATIONS DONE IN CASES OF BILATERAL CALCULUS.

Operations.	Cases.	Nature of Operations.	Results.	Remarks
Chevalier	1	Unilateral nephrotomy	R	Anuria of 14 days preceded operation.
Championnier	1	Unilateral nephrolithotomy	R	Same for 13 days.
Deaver	1	Nephrolithotomy on one kidney. 18 days later nephrectomy on same kidney. 9 months later nephrolithotomy on other kidney.	R	
Deansley	3	(1) Nephrolithotomy on one kidney. 2 week later same on other kidney. (2) Unilateral nephrolithot. No operation on other kidney. (3) The same.	R R R	
Desnos	1	Unilateral nephrolithot.	R	Anuria 12 days preceding operation.
Duret	1	Unilateral nephrolithot.	R	Same 10 days.
Delbet	1	Unilateral nephrolithot. Second kidney same one year later.	R	Hydronephrosis of first—pyonephrosis of second.
Kummel	16	5 with anuria — Unilateral nephrolithotomy. 11 without anuria, same operation with second kidney done after an interval in each case.	3 D 2 R 9 R 4 D	
Grohe	1	Unilateral nephrolith on one kidney and same on other after 15 days.	R	
Mixter	1	Same—second kidney done six months later.	R	
Tuffier	1	Same and later, at two intervals, same on second kidney.	R	
Verdi	1	Same. Calculus passed. Spontaneously from other.	R	
Watson	2	Simultaneous bilateral nephrolithotomy in both.	1 D 1 R	Anuria in fatal case See illustrative cases.
Young	1	Unilateral nephrolithot.	1 D	See illustrative cases.

Total 32, Deaths 9=27.9 per cent.

nomenon has been demonstrated. Four cases at least are well authenticated however.

But comparatively little mention is made of the not very common, but still very important cases, in which the suppression of the function of the unobstructed kidney takes place because of the calculous obstruction of its fellow when the unobstructed organ is in varying degrees diseased or disabled in its functional capability, but not wholly destroyed, possessing a lessened but by no means unimportant functional power could it be set free.

With regard to the frequency of bilateral calculus, we have realized since the use of X-ray photography that these cases are much more frequent than had previously been supposed. They may be estimated at 30 per cent. of the total number of cases of renal calculus. This estimate is based upon the reports of 231 cases of renal calculus made by Albarran, Legueu, Morris, Kummel, and Kraft. The first two place the number as high as 50 per cent., Morris as low as 10 per cent., but the average in the 231 cases referred to was 30 per cent.

Now if we put together all the cases of bilateral calculus, those in which the unobstructed kidney when it is more or less diseased and has had its function suppressed by reflex influence, but in which it is by no means incapable, and the small contingent in which the surgeon may have operated by mistake upon the most damaged of the two organs instead of the least injured one, there is a considerable number in which, if the operator rests content with having laid open one kidney, he will not have liberated all the functionally capable renal substance which is possessed by the individual, all of which he assuredly needs. In such circumstances, the writer believes, the second kidney should at once be laid open if the patient's condition makes it proper to do so.

Before the operation, in cases of bilateral calculus with anuria, the surgeon can never be entirely confident which of the two organs is the more seriously damaged, unless he has had the aid of an X-ray picture taken by an expert in photography of renal calculi or unless the functional capability of each kidney has been established by means of the ureteral catheter, before the advent of anuria, or after anuria has occurred by detecting by the same means a calculus in both ureters.

In practice we shall frequently be deprived of the aid of these procedures, for the condition is one of the most serious of surgical emergencies and when the surgeon is called in, no time can be lost in making such examinations, even if an expert X-ray photographer should be available, which is frequently not the case. The cases in which the ureteral catheter will render valuable service are also few.

In most instances we shall have to depend on the physical examination and the history of the case alone, and the chances of being misled, more particularly in cases of bilateral calculus, are considerable, because of the absence of characteristic evidence, which, were it present, would enable us to determine whether calculus exists on one or both sides, and if on both, which of the two kidneys has received the least damage.

In the unilateral cases also there will always be a certain number in which the operator must be in doubt whether the first kidney operated upon will alone be capable of sustaining life after having been freed of its obstruction. The ones in which the greatest uncertainty is likely to arise are the non-infected hydronephroses which have but a small amount of good secreting substance left in them, for we all know how long such apparently inadequate amounts of renal substance are nevertheless capable of doing enough work to keep patients alive and in reasonably good condition. With the infected renal retentions of calculus origin the operator will feel less doubt as to the functional incapability of the organ, for a well-marked infection will render unfit for service what appears to the eye to be a considerable amount of renal substance, while on the other hand what seems to be an entirely inadequate quantity will sometimes, if not infected, be capable of sustaining life. In the infected cases therefore there should be less hesitation, when the operator is in doubt, in cutting into the second kidney at once than in the non-infected ones.

A study of the cases of unilateral renal calculus with anuria shows that in the larger number of them the organ of the opposite side is either absent or totally destroyed functionally. In the minority—but an important minority—there is more or less disease or destruction of the secreting substance of the unobstructed kidney, but enough of it is left intact to contribute importantly to the sum total of renal activity, if its function were reëstablished.

In a few instances the unobstructed kidney has been normal. There are at least four such cases authentically reported. The reflex suppression of a normal kidney has been denied by a number of observers and affirmed by others.

That the sudden obstruction of the ureter of one kidney produces total suppression of the function of its fellow organ when the latter is extensively injured or diseased, is an unquestioned fact, and though less well recognized it is also true when the disease in that kidney is but moderate or very little. That this should not happen more often in cases of calculous anuria is rather surprising when it is remembered that the same thing takes place in the remaining kidney after nephrectomy, if that kidney is more or less diseased, and that urinary suppression occurs as the result of operations upon other parts of the urinary tract or elsewhere in the body, even in some cases when the operations have been trivial in character.

Just what the number of cases may be in which the condition of the first kidney operated upon will be found to be so diseased as to make it proper to lay open the second one on the chance of freeing an additional amount of functionally active renal substance sufficient to contribute importantly to the chance of saving the patient, it is impossible to say. The point which the writer wishes to establish is merely that the probability of being able to do this by cutting into the second kidney should be judged largely by the amount and condition of the renal tissue found in the first one laid open, and whenever it is seen to be but very small in amount or if it is seriously infected and suppurating, even though it be somewhat more in actual quantity, that the surgeon should then give the patient whatever chance of benefit may be derived from cutting into the second kidney at once, unless, of course, previous examinations with the ureteral catheter have already demonstrated the absence or total destruction of the kidney on the other side.

In conclusion the writer would also urge the performance of bilateral nephrostomy at one sitting in cases of bilateral renal calculus without anuria, as well as in those with it, except the patient's condition be such as to make the longer time required for opening the two kidneys an obviously improper danger to which to submit him.

So far as the writer is aware this procedure has been done only by himself. (The case is one of those described at the end of the communication. The patient made an uneventful recovery.) In Wagner's contribution to the Handbuch der Urologie of Frisch and Zuckerkandl, he says that the calculus should be removed from the second kidney always, then, underlining the words, he adds, *but never at one sitting.*

On what principle this advice is given and why this custom has invariably been followed with the one exception mentioned, the writer is at a loss to understand. It is not based upon actual experience of bad results obtained from having done the operations simultaneously upon the two kidneys, since the writer's case which has not been published is the only one, and as has been said, the patient made an uneventful recovery.

The only objection to the procedure that could reasonably be made is that shock might be too great if both the kidneys should be operated upon in one sitting. This objection has not been sustained in the three cases in which the writer has operated upon the two kidneys at one time for three somewhat dissimilar conditions, nor is it borne out by such experiences as we have of the bilateral simultaneously performed renal operations, such as nephropexy and decapsulation (sometimes with nephrotomy added to it.)

On the other hand in these bilateral cases without anuria there *is every reason for removing* the calculi from both kidneys at the same time, for why should suppuration—even in cases in which there is but an insignificant amount of functionally capable renal substance present in one or another of the organs—be allowed to be perpetuated by the presence of a calculus, and why should either kidney, if functionally capable substance *is* present in it, be subjected to the destructive influence of a calculus any longer than need be. For which reasons the stones, unless of insignificant size in one of the kidneys should be removed at the same time from both organs in cases of bilateral calculus with or without anuria under the conditions named.

Appended is the report of some cases which have direct bearing upon the subject of this communication, and also a table of cases of bilateral calculus in which operations were performed—with two exceptions—upon the two kidneys at different times with an interval between the operations.

CASE I.—A multipara, aged thirty-five years. Hematuria and pyuria had been present for about three weeks before her entrance into the hospital, and were accompanied by marked vesical tenesmus and frequent micturition. There was also at that time a good deal of phosphatic sand in the urine. Up to that time she had never passed renal calculi nor had any kidney pain.

The general condition was good and there was little or no fever. The urine contained a nearly normal quantity of solids, the sediment was large. It consisted of pus, a moderate amount of blood, a good deal of thick stringy mucus, vesical epithelium, a large amount of crystals of triple phosphates and phosphatic sand. The urine was ammoniacal.

No tenderness or enlargement of either kidney. Appetite good; no constitutional disturbance.

Cystoscope showed what was believed to be a partly necrotic papilloma of the bladder, with long villi floating far out from the vesical wall.

The hematuria became much less after the patient had been in bed for a few days.

Operation.—Suprapubic cystotomy. A large mass was found occupying the interior of the bladder and attached to the lateral wall (a little external to the orifice of the right ureter) by a pedicle about as thick as the thumb.

The pedicle of the supposed tumor was divided with the writer's galvano cautery scissors, a margin of the surrounding tissue being included in so doing, and the mass was removed. On examination it proved to be the entire inner lining of the bladder which had undergone necrosis and had involved a part of the muscular structure of the organ, so that it was partly detached from the surrounding tissue and gave the impression of the pedicle of a new growth.

The bladder was drained and the incision healed slowly by granulation. The recovery was uneventful.

The patient remained well until about six months before her second entrance to the hospital. She then for the first time began to have more or less pain in both kidneys and hematuria reappeared. She also had oliguria occasionally.

For three days before entering the hospital very little urine was passed, and for the last twenty-four hours there was complete anuria. Uremic symptoms began to be manifested on the day before her admission and were progressive.

Temperature 102° to 103° F. Pulse rapid. Tongue coated. Bowels constipated. Occasional vomiting. Intellect clouded. Moderate distension of abdomen and slight spasm of the muscles of the right side. Some tenderness in both flanks. Twitching of muscles of hands and forearms. General condition critical.

Operation.—Third day of anuria, thirty-six hours after beginning of uremia. The patient was placed upon the abdomen across the inclined planes made by the Cunningham "Kidney operating table." The right kidney was first exposed in the loin; it was found to be buried in a mass of connective tissue and was universally adherent. In separating it from this mass at the upper part of the organ, a large perinephritic abscess, communicating with the interior of the pyonephrotic kidney, was opened. In the pus which escaped were several fragments of phosphatic stone. The kidney was laid open parallel with and a little posterior to its convex border.

The kidney was pyonephrotic and its secreting substance extensively destroyed. Enough of it, however, remained intact, it was thought, to be in some measure functionally capable. A perforation near the upper pole communicated with the perinephritic abscess. A large calculus lay in the pelvis and sent branches into the dilated calyces. A part of the calculus only could be removed.

While the writer's colleague, Dr. Blake, cleansed the operative field, sutured the wound in part, and arranged drainage, the writer laid open the second kidney and removed broken bits of calculus from it. The conditions on this side were similar to those upon the other; there was, if anything, a little less secreting substance in the kidney, and the stone was smaller. The calculi occluded the outlet of the renal pelvis of each kidney. The wound and drainage were arranged as on the other side. The operations occupied twenty-five minutes altogether.

Both kidneys began to secrete within three hours after the operations, the first one operated upon, abundantly, the second one not so much. On the following morning the patient felt decidedly better and the uremic symptoms had almost entirely ceased. This improvement was maintained for twenty-four hours. Uremia was then once more noticeable, and she died on the third day.

Shock played no part in causing death. No autopsy.

CASE 2.—A man of thirty-five years of age, in good general condition, who had had for a good while more or less characteristic evidence of renal calculus on the right side, and for the past year suggestive signs of it on the left as well.

X-ray pictures showed clearly a calculus in the right kidney and gave a doubtful shadow in the left one.

Operation.—By mistake the first kidney operated upon was the one in which the doubtful shadow of the X-ray photograph had appeared. It was laid open after being exposed by the usual incision in the loin. Exploration of the interior of the kidney failed to discover a calculus. The renal and outer incisions were both closed tight by suture, without drainage. The other kidney was then laid open and a calculus about the size of a chestnut was removed from one of the calyces. The kidney was but slightly infected. The calculus had a smooth surface. A drainage tube was placed in the kidney and the renal incision was closed around it. The outer wound was closed except for a space sufficient to allow the passage of the tube. Drainage maintained for two days Wound closed in a short time. The incision on the other side healed per primam. Recovery uneventful.

CASES 3, 4, and 5.—These were all of them cases of bilateral renal infection with extensive suppuration.

The surgical intervention in the first of them was a simultaneously performed bilateral nephrostomy. Drainage of both kidneys. This patient made a good recovery without persistence of fistula.

In the other two cases unilateral nephrotomy only was done. Both patients died. Both had abscess of the other kidney. One of them would probably have lived had the second kidney been opened.